

A Study on the Industrial River Pollution in DMDP Area and Planning Approaches

Sania Sifat Miti*
S. M. Nawshad Hossain**
Md. Lutfur Rahman²

Abstract: Location is a major concern for industrial development. Industrial development plays a vital role for development of economic growth in the developed as well as developing country. Developing country like Bangladesh, most of the industries are located besides the river because of suitability of transportation. Dhaka, the capital city of Bangladesh, is bounded by five rivers which are polluted for unplanned industrial development. In the study, it is tried to suggest some guidelines from planning perspective to control the industrial river water pollution in the DMDP area by analyzing existing planning laws, causes and impacts of river pollution in the study area. To do this, the level of river pollution by industrial wastes are also tried to determine.

Introduction

Bangladesh observed industrialization since last one hundred years. The process was in small level but with the change of time, the appearance of industrialization has changed. Garments industries have taken the place of handlooms. This has happened not only in the case of garments industry but also in other industries because of mechanization. Our country is facing a great challenge to protect the environment because of this kind of industrialization. The industrial belts are being more and more polluted with a numerous population. The main two industrial belt of Dhaka Metropolitan Development Plan (DMDP) area are Dhaka and Narayanganj District. Dhaka, the capital of Bangladesh is situated on the bank of Buriganga River, around which there are many different types of industries that pollute the water of the river. Narayanganj is the largest industrial belt of DMDP area. Most of the dyeing industries (Almost 80%) of Bangladesh are situated here (Sayem, M. A. 2007). The town planning and utility service providing authorities of these areas, e.g. RAJUK, Narayanganj Pourashava and WASA are now facing a great challenge to keep the environment clean that has an effect on different burning issues such as water supply, solid waste management, landscape etc. The legislative process of the environmental issues was drawn very recently in Bangladesh. The earliest environmental protection legislation was the Water pollution control ordinance, 1970. It was amended after the emergence of Bangladesh as a sovereign country by the water pollution control order, 1973 and later by Environmental pollution control ordinance known as EPC ordinance 1977. A new legislation was enacted by national assembly in 1995 as Environmental conservation Act, 1995. In these circumstances, this study tries to come up with finding the major causes and effects of industrial river pollution and analyzing the existing laws to control such kind of pollution.

Objectives and Methodology of the Study

The objectives of this study are determining the level of river pollution by industrial wastes in the DMDP area, finding out the causes and impacts of industrial river pollution in the study area, and analyzing the existing provision of planning laws to control the industrial river

* Lecturer, Department of Urban and Regional Planning, Jahangirnagar University, Savar, Dhaka-1342.

** Lecturer, Department of Urban and Regional Planning, Jahangirnagar University, Savar, Dhaka-1342

*** Lecturer, Department of Urban and Regional Planning, Jahangirnagar University, Savar, Dhaka-1342.

pollution and recommending some guidelines from planning perspective to control the industrial river water pollution in the DMDP area. In the study, both primary and secondary data are used. Few samples are collected from different rivers in the study area and these are tested for finding some parameters (i.e. Temperature, Turbidity, pH, DO, BOD, TDS and TSS etc.) in the laboratory.

Study Area

The DMDP area is surrounded by five main rivers – Buriganga, Shitalakkhya, Turag, Balu and Dholesshori. But here our concern is the Buriganga and Shitalakkhya River. These two rivers are located in Dhaka City and Narayanganj District respectively.

Present Scenario of the Rivers in the DMDP Area

These two rivers, Buriganga and Shitalakkhya River are surrounded by several types of industries. These industries are responsible for polluting the Buriganga and Shitalakkhya River. This situation is deteriorating day by day. In Bangladesh the standard of water quality for different purposes are fixed by Department of Environment (DoE). But the water quality of these rivers deviates from the standard level fixed by DoE. The Table-1 shows the standard of water for different purposes adopted by DoE and the Water Quality of Buriganga and Shitalakkhya River.

Table 1: Comparison of the Water Quality of the Study Area with Standard Fixed by DoE

Parameters	Unit	Values of Samples with Corresponding Standards of DoE				
		Shitalakkhya River	Buriganga River	Fishing Water Standard	Drinking Water Standard	
Physical Parameters	Color	-----	Very cloudy	Not Clear	Greenish Brown	Colorless
	Odor	-----	Odorless	Disturbing Smell	Odorless	Odorless
	Taste	-----	Tasteless	Disturbing Test	Tasteless	Tasteless
	Temp.	(^o c)	37.6	32.3	24-36	30
	pH	-----	8.7	7.95	6.5-8.5	6.5-8.5
Chemical Parameters	Turbidity	unit	14.67	49.73	25	25
	DO*	ppm	2.17	8.2	4	4-8
	BOD**	ppm	1.5	2.59	0.75-1.5	Nil
	TDS***	ppm	3870	3130	Nil	1500
	TSS****	ppm	145.73	118.33	5	10
	Salinity	ppm	3280	4.57	500	150-250
	EC*****	μS	7.62	6.26	0.0008	4*10 ⁻⁸
	Arsenic	mg/l	0.08	--	0.05	0.05

* DO- Dissolve Oxygen. ** BOD - Biological oxygen demand. *** TDS- Total Dissolved Solid

**** TSS- Total Suspended Solid. ***** EC- Electrical Conductivity

Main Causes of Industrial River Pollution in the DMDP Area

Through empirical field level observation and analyzing secondary sources, it is cleared that followings are the main causes behind the industrial river pollution of Buriganga and Shitalakkhya River in the DMDP area.

- **Haphazard Growth of Industries:** Industries in Narayanganj and Dhaka area around Shitalakkhya and Buriganga River are built up haphazardly without proper zoning. This type of unplanned industrial development is responsible for river pollution in the study area.
- **Unregistered Small Scale Units:** There are many unregistered small scale industrial units both in Dhaka and Narayanganj district. It is very likely that most of these industries do not have any treatment plant or facilities. These industries discharge the harmful industrial wastes without treatment either directly into the Buriganga and Shitalakkhya River or dump the wastes into the municipal drains and lastly the drain water discharges to these rivers. So these unregistered small scale industrial units are also responsible for industrial river pollution in the DMDP area.
- **Lack of Pollution Control Systems or ETP:** Most of the industries in Dhaka and Narayanganj district do not have the provision of ETP (Effluent Treatment Plant) for the treatment of industrial wastes. So when these untreated industrial wastes directly or indirectly discharge into the rivers, this causes serious river pollution in this area. Some industries have the provision of ETP, but these are not in operation due to high operation cost. As a result these kinds of industries also pollute the rivers in an alarming rate.
- **Lack of Monitoring:** There are some strict rules and regulations in the country to control industrial river pollution. But there is absence of proper monitoring by government authorities to implement these rules and regulations. Owners of the industries use this chance of lack of monitoring facilities and setup industries without any effluent treatment facility, ultimately which cause river and different types of environmental pollution.
- **Lack of Common Treatment Facilities:** A large number of small scale industries do not have individual effluent treatment plants as it is not an economic proportion for them. Common treatment facilities that can cater a cluster of industries to treat the industrial wastes can be the only alternative solution to control industrial pollution. But due to lack of such type of facilities the rate of industrial river pollution is increasing day by day in an alarming rate in the DMDP area.
- **Lack of Economically Viable Treatment Technologies:** Most of the treatment facilities available are too costly and beyond the capacity of small scale industries. This led to serious industrial river pollution in Dhaka and Narayanganj district.
- **Pollution by Navigable Vessels:** It is often observed that different types of motorized navigable vessels pollute the river Buriganga and Shitalakkhya in the study area by mainly discharging petroleum or lubricant material into the river water. In most of the cases it exceeds the tolerable limit, which is ultimately responsible for the make the water unusable for various purposes and death of fishes and other micro-organisms of the river.
- **Dumping of Clinical Wastes:** One of the main reasons of water pollution of the Buriganga River is the unauthorized dumping of clinical wastes into the river. Mitford Hospital (Sir Solimullah Medical College Hospital) is situated on the bank of the Buriganga River. The clinical wastes of this hospital and wastes of some other hospitals and clinics of Dhaka city are directly dump into the Buriganga River without treatment, which create serious pollution of the river.
- **Lack of Awareness:** Lack of personal awareness is another cause of industrial river pollution in our country. Most of the industry owners are not aware about the industrial pollution. This rather a significant cause of river pollution in the DMDP area as well as in the entire country.

Impacts of Industrial River Pollution in the DMDP Area

Water pollution is a global problem, which differs with levels of development. In general terms, water pollution has severe impacts on the usefulness and value of water resources, with negative impacts on ecosystems, fisheries, food production, health and social development, and economic activities. Water pollution can cause or aggravate tension and conflict, among water users and even between countries. The polluted or poor quality of water has various negative effects on the human health and on the environment, too. The impacts of polluted river water in the study area can be categorized into two parts:

- Impacts on Human Health
- Impacts on the Environment

Impacts on Human Health: Both in Dhaka and Narayanganj district, DWASA is the only responsible authority to supply drinking water. The water of Buriganga River and Shitalakkhya River is one of the main sources of water supply of DWASA for Dhaka and Narayanganj district respectively. But the laboratory test result of the water of the Buriganga and Shitalakkhya River shows that the water of these two rivers is not suitable for drinking purposes as compared with the standard level for drinking water fixed by DoE. If this polluted water is not properly treated by DWASA in its treatment plant before supply, then it will be unsuitable for drinking. The laboratory test result of drinking water of some residential of Dhaka and Narayanganj district shows Table-2 that the water quality is very poor to use for drinking purpose.

Table 2: Drinking Water Quality of Dhaka and Narayanganj Area

Parameters		Unit	Value of Samples with Corresponding Standards of DoE				Drinking Water Standard
			Dhaka		Narayanganj		
			Residential Area (Mirpur-1)	Residential Area (Basabo)	Residential Area (Paikpara)	Residential Area (Sutarpara)	
Physical Parameters	Color	----	Cloudy	Cloudy	Clear	Cloudy	Clear
	Odor	----	Chlorine	Chlorine	Chlorine	Chlorine	Odorless
	Taste	----	Chlorine	Chlorine	Chlorine	Chlorine	Tasteless
	Temp.	(^o c)	35.3	36.1	37.2	36.2	30
	p ^H	----	9.12	8.89	8.91	9.3	6.5-8.5
	Turbidity	(ppm)	33.23	32.85	32.22	36.62	10
Chemical Parameters	DO	(ppm)	4.33	4.38	4.22	4.15	6
	BOD	(ppm)	0.35	0.29	0.28	0.37	0.2
	TDS	(ppm)	6240	6190	6930	5820	1000
	TSS	(ppm)	78.18	76.82	88.36	128.66	10
	Salinity	(ppm)	6170	5990	6400	5340	-----
	EC	μS	14.7	15.1	16.64	12.68	.05-5
	Arsenic	mg/l	0.08	0.08	0.08	0.09	0.05

Source: Laboratory Test from Dept. of Environmental Sciences, JU, April, 2010

This poor quality of drinking water supplied by DWASA is responsible for various waterborne diseases. Besides the use of the polluted river water for bathing, washing and other purposes create different serious water-born diseases.

Impacts on the Environment: The polluted water not only creates negative impacts on the human health, but also creates negative impacts on the environment. In the study area, Dhaka and Narayanganj district- the polluted water has various negative impacts on the environment. Some of the negative impacts are mentioned below:

- The polluted water hampers the aesthetic views of the rivers.
- It destroys the aquatic ecosystem, which is the habitat of variety of aquatic organisms. This polluted water also hampers the aquatic food production and as a result a large number of aquatic organisms die every year.
- The life threatening chemical components of the polluted water kills a large number of fishes and other aquatic organisms and microorganisms.
- It is observed that at the time of flood and heavy rain, the low-lying parts of the study area are inundated with the polluted water of rivers. By coming contact with this polluted water and absorbing the water through roots many trees die for the presence of harmful components in the water.

Besides the above impacts, the polluted water even cannot be used for drinking and other necessary purposes.

National and International Policies to Control River Pollution

International Laws to Protect the Water Quality: International regulation to protect water quality affects industry, including transnational corporations, by limiting emissions into the marine environment, by placing restrictions on other uses of marine resources, including transport, and by requiring the adoption of measures of prevention and reparation, the costs of which are integrated into production processes. International regulation for the protection of water quality is well developed at the global and regional levels: many of the existing international instruments were adopted by the early 1980s.

Leading instruments include the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters (1972 London Dumping Convention), the 1972 Oslo Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft (the 1972 Oslo Convention), the Paris Convention for the Prevention of Marine Pollution from Land-Based Sources of 4 June 1974," the marine pollution convention. Adopted under the UNEP Regional Seas Programmed initiated in 1975 and administered by the Ocean; and Coastal Areas Programmed Activity Centre, and the 1982 United Nations Convention on the Law of the Sea, which has not yet entered into force. More recently, global legal instruments and decisions relating to water quality include the 19 ' amendments to the Contract Regarding an Interim.

The laws stated above, all are related to marine environment because it is only the global issue that is related to water. But most of the countries of the world have their own water policy both inland & marine. Though we have a national water policy, as a nation, we are not aware about it at all. Absence of water quality monitoring cell, the scene becoming poorer day by day.

In India, The Central Pollution Control Board (CPCB) has established a network of monitoring stations on rivers across the country. The monitoring is done on monthly or quarterly basis in surface waters and on half yearly basis in case of ground water. The monitoring network covers 189 Rivers, 51 Lakes, 4 Tanks, 2 Ponds, 3 Creeks, 4 Canals, 10

Drains and 218 Wells. Among the 870 stations, 566 are on rivers, 55 on lakes, 10 on drains, 12 on canals, 4 on tank, 3 on creeks and 2 on pond and 218 are groundwater stations. The monitoring of water quality at 256 stations is being done on monthly basis, 392 stations on quarterly basis, 218 on half yearly basis and 4 stations on yearly basis. They use only six criteria named Total Coli forms Organism MPN/100ml, pH, Dissolved Oxygen, Biochemical Oxygen Demand, Free Ammonia (as N) & Electrical Conductivity for this huge job.

In Thailand, pollution crisis in Nam Phong river occurred on 5 December 1997. Over 500,000 fish in Nongboanoi Village died. Enormous numbers of shellfish and other aquatic fauna were also killed and could be seen floating everywhere along the waterway. Environmental Health Center started to investigate about the reason of the tragedy. They used only 4 parameters at the first phase and at the second phase they used 14 parameters.

Table 3. The water quality variables examined by Thai government.

First Phase	Second Phase
<ul style="list-style-type: none"> - Dissolved oxygen (DO) - Electrical conductivity (EC) - pH - Temperature 	<ul style="list-style-type: none"> - Dissolved oxygen (DO) - pH - Electrical conductivity (EC) - Temperature - Biological Oxygen Demand (BOD) - Chemical Oxygen Demand (COD) - Suspended Solids (SS) - Total Dissolved Solid (TDS) - Chloride (Cl) - Sulfate (SO₄) - Nitrate (NO₃) - Lignin-Tannin - Flow - Hardness and Turbidity

Source: http://advisor.anamai.moph.go.th/factsheet/index_en.htm

Though we have a national water policy, and as we are not organized to implement it from the central level, we can implement it from the micro level. Paurasava can be such a level. As water quality is a matter of great concern, Narayanganj Paurasabha can monitor it on a periodic basis. DoE, BCSIR or Atomic Energy Commission can provide technical assistance to do this.

Policy Evaluation to protect Industrial River and Water Pollution at National Level:

Recognizing the importance of environmental protection, the government has created a ministry- "The Ministry of Environment and Forest (MOEF)" and within it, a new Department of Environment. A Director General heads the Department of Environment. The Department of Environment continuously monitors the environmental level and imposes regulatory measures on industrial units, automotive vehicles and other areas of concern. Despite limited resources and expertise, the department also collects river water samples at random and continuously examines them in its laboratories.

Due to the national and international anxiety regarding environmental pollution, the Government formulates following policies, rules and regulations.

- Bangladesh Environment Policy, 1992
- The Bangladesh Environment Conservation Act, 1995
- The Environment Conservation Rules, 1997
- National Water Policy, 1999
- The Bangladesh Environment Conservation (Amendment) Act, 2000
- The Environment Court Act, 2000

The Environment Policy, 1992: The environmental strategies primarily included in this policy are as follows:

- Ensure environmentally sound utilization of all water resources
- Ensure that water development activities and irrigation network do not create adverse environmental impacts
- Modification Steps are to be undertaken by the existing industrial units in course of time
- Environment Impact Assessment (EIA) report must be obtained before establishment of new industrial unit
- Establishment of new industries affecting Environment should be banned and the existing polluting ones should be stopped in course of time
- Ensure that all steps taken for flood control including construction of embankments, dredging of rivers, digging of canals etc be environmentally sound at the local, zonal and national levels
- Ensure mitigatory measures of adverse environmental impact of completed water resources development and flood control projects
- Keep the rivers, canals, ponds, lakes, haors and all other water bodies and water resources free from pollution
- Ensure sustainable, long term, environmentally sound and scientific exploitation and management of the underground and surface water resources
- Conduct Environment Impact Assessment before undertaking projects for water resources development and management

The Bangladesh Environment Conservation Act, 1995: The terms “Ecology”, “Environment”, “Pollution”, “Environment Pollutants”, “Environment Conservation” etc. have been clearly defined by this law. This law has prohibited excessive environmental pollutants and for the violation of the rule the penalty of imprisonment not exceeding ten years or fine not exceeding ten lack taka or both can be imposed.

The Environment Conservation Rules, 1997: Under the “Environment Preservation Rules 1997” all industrial units have been classified into 4 classes on the basis of the intensity of contribution to pollution:

- Green
- Orange-A
- Orange- B
- Red

In order to obtain clearance from the DoE, different formalities are to be observed for the different class of industries. For a new proposed industry under group "Green" environment clearance is given directly for three years. Industries classified within the other groups receive clearance in three phases for ensuring that the environment will not be adversely affected by the industries, i.e.:

- Clearance in respect of location
- Temporary clearance certificate
- Long-term clearance certificate

In order to obtain clearance to set up an industry under group Orange-B, an Initial Environment Examination (IEE) report and Effluent Treatment plant (ETP) must be submitted. With the exception of pre-existing units, Environment Management Plan (EMP) must be submitted for environment clearance. For clearance in the case of "Red" group industries, an Environment Primary Evaluation report along with an Environment Impact Assessment (EIA) ought to be produced. Provisions of imprisonment and fines have spurred the industries to set up without obtaining clearance from the concerned department. All these are formulated to protect the environmental pollution by industrial units.

National Water Policy, 1999: With over 50 clauses of relevance to the environment, the National Water Policy (NWP), 1999, forms a comprehensive framework for ensuring activities in the water resources sector are fully environment friendly. Its many environmental concerns and specific demands recognize that most of the country's environmental resources are linked to water. Compliance with the Policy will ensure that the development and management of the nation's water resources include protection, restoration, preservation of natural habitats and their dependent bio-diversity, and water quality - with specific provisions for wetlands, mangrove and other forests, and endangered species. The Policy also prescribes water resource management practices that avoid, or at least minimize, environmental degradation. Specific provisions include:

- Protection, restoration and enhancement of the water resources;
- Protection of water quality, including strengthening of the regulations concerning agrochemicals and industrial effluent monitoring;
- Facilitation of potable water and sanitation provision;
- Provisions for fish and fisheries;
- Participation of local communities is a requirement for all water sector development as a subject to an environmental assessment procedure and for the planning and management process.

In addition, the Government of Bangladesh has signed several international conventions that have implications for environmental aspects of water resources planning. The major conventions are: Agenda 21, the 1992 Rio Convention on Climate Change and Biological Diversity, the 1971 Ramsar Convention on Wetlands, the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the 1954 International Convention for Prevention of Pollution of the Sea by Oil. Under the last, permitted discharge amounts and locations from ships are specified. Bangladesh has also ratified the Marine Pollution Conventions (MARPOL). These conventions regulate handling of domestic and (bilge) oil waste from ships, and receptor facilities in harbors, as well as domestic and waste oil handling from oil platforms.

The Bangladesh Environment Conservation (Amendment) Act, 2000: To implement the different schedules of Environment Act along with establishment of Environment Courts for the trial of offences against the person(s) responsible for environmental pollution including river pollution, a necessary amendment to the “Bangladesh Environment Conservation (Amendment) act” had been passed by the Parliament and was published in the “Bangladesh Gazette” on April 10, 2000.

The Environment Court Act, 2000: “The Environment Court Act, 2000” had been passed by the Parliament on April 6, 2000 for the establishment of environmental courts for the trial of offences relating to the environmental pollution including industrial river pollution and matters incidental thereto. Under this Act, one Environment Court will be established in each Division.

Recommendations from Planning Perspective to Protect Buriganga and Sitalakkhya River from Industrial River Pollution

1. Establishment of ETP for Each Industry: The local administration, Town Planning Authority (RAJUK, Pourashavas of Narayanganj District) has scope to compel those polluting industries to establish Effluent Treatment Plant (ETP) on an emergency basis within the jurisdiction of the Pourashava, in order to stop industrial water pollution.

- To do this the Town Planning Authorities at first can request and then can give pressure to each industry to establish ETP. If any industry has failed to establish ETP, then the Authorities can request or pressure if necessary to the different utility service providing authorities, e.g. electricity, gas, water, telephone etc. to disconnect the services to that industry.
- At the same time the Town Planning Authorities can be ensured of establishing ETP from newly establishing industries at the time of issuing No Objection Certificate (NOC).

2. Industrial Wastewater Regulation and Management Framework:

- The newly framed rules for Environment conservation in Bangladesh have weakness in its application and enforcement. Department of Environment in all respect is a line organization like any other common department of country, although pollution control management by definition is a sector cross cutting problem.
- Appropriate law and rules should be promulgated so intoxic waste can easily recognized.
- Present organization set up of DOE is meant for monitoring Environment in the country and centered at headquarters, not capable to carry out field level supervision, as it required by the Environment Conservation Act, 1995. It is necessary to incise technical personalities of DOE so that they can carry out field level supervision.
- The existing environment management is totally dependent on the regulatory instrument on the legal system of the country. That should be changed.
- Presently industries in Bangladesh are free to pollute Environment, Though the environment regulation have been passed to control pollution, the institutional set up, services and data base are not sufficient to enforce compliance. The resulting is surface water pollution. That should be checked.
- The present organization structure for environment management is regulatory and almost no scope exists for persuasion and voluntary agreement with the polluters. It is totally controlled by the ministry and no scope let to the department for adjustment and compromise. It should be reformulated if we want ensure an efficient waste management for whole the country.

- Since any communication with the other department and organizations should be through ministry of environment and forest, the inter organization communication is not encouraging. This leads to lack of interaction with other department. Interaction between inter department should increase.

3. Regular Monitoring: The Town Planning Authorities can monitor the overall situation of industrial wastewater discharge into the surrounding water bodies on a regular basis and can also fix certain charges for those industries, which are still discharging untreated wastewater into the water bodies after the establishment of ETP.

- For this purpose the Town Planning Authorities have to take a surprise investigation program of checking the standard of the industrial effluent of any industry at any time. For this help from the DoE can be taken. If it is observed that the quality of the effluent is higher or lower than the standard fixed by the DoE, then that industry must have to pay a big amount of fine to the DoE and Town Planning Authorities.

4. Institutional Arrangement:

- The organizational structure of the DOE should cross cutting through designing a section of different offices as environmental officer for the department and that section should keep close contact with the department of environment for each and that section should keep close contact with the department of environment for each and every program related to environment
- The enforcement of environmental conservation act would require huge technical support to test samples. The department is already over stretched with its limited resource. A network of testing laboratories should be encouraged in private sector for testing wastes samples.

5. Restrict or Reduce the Level of Water Pollution from Navigable Vessels: RAJUK and Pourashavas of Narayanganj district has scope to restrict or reduce the level of water pollution by the navigable vessels to the tolerable level in the river Buriganga and Shitalakhya with the coordination of BIWTC.

- It is often observed that different types of motorized navigable vessels pollute the river Buriganga and Shitalakhya in the study area by mainly discharging petroleum or lubricant mater into the river water. In most of the cases it exceeds the tolerable limit, which is ultimately responsible for the make the water unusable for various purposes and death of fishes and other micro-organisms of the river. The Town Planning Authorities of Dhaka and Narayanganj can request the BIWTC to take certain measures like charging fines to the water going vessels for polluting the river.

6. Stop Dumping of Clinical Wastes into the Water Bodies to Control Water Pollution: By arranging the clinical wastes disposal system of the hospitals and clinics the water pollution of Buriganga River can be reduced. And DCC and RAJUK has scope to play the vital role for this program.

- DCC can take steps for clinical waste disposal systems by its own arrangement to stop dumping harmful clinical wastes into the Buriganga River.
- On the other hand RAJUK can give pressure to the existing hospitals and clinics to establish their own waste disposal system to protect dumping of clinical wastes into the rivers.

7. Establishment of Industrial Development Framework to Protect Water Pollution: RAJUK and Pourashavas of Naryanganj district can make an effective Industrial Development Framework to protect the water pollution in the jurisdiction of the Pourashava

by analyzing different laws, rules and regulations and management strategies of the Bangladesh Government for industrial development and industrial pollution control. And the Town Planning Authorities will be the soul authority to monitor this framework for the development and control the pollution within their jurisdiction.

- There are some rules, regulations, laws, measures and tools of Bangladesh Government, some of which directly and indirectly related to the industrial Town Planning Authorities of Dhaka and Narayanganj district can easily prepare specific framework for proper industrial development and control the industrial pollution for their jurisdiction.

8. Government policy Related Industrial waste Management:

- The implement of environment protection standards and pollution control mechanics alone is not enough; the industries in the first instances are to be encourages avoiding and reducing waste from the industrial process. The waste minimization techniques often prove to be very cost effective and enhance the economic viability of the industry. These deficiencies should be removed.
- Government is to assist development of environmentally sound and appropriate technology and encourage relevant extension activities.
- Government should officially encourage cleaner technology and individual treatment through subsidies, waste minimization audits and pollution control guidelines.
- Combined effluent treatment should be encourage through technical assistance and concessional credit facilities
- Reallocation in appropriate cases should be facilitated technical assistance and credit facilities.

9. Institutional strategy for environmental at rules and regulation:

- Information disclosure regarding environmental pollution control management should be given priority to create demand for quality environment in the society
- Gradual escalation of stringent measures against violators should be well circulated and preferable avoided for more persuasive agreement
- Environment awareness building, especially on pollution control should be given high priority in every stage of education, training and department programs.

10. Conducting Research on this Field of Industrial River and Water Pollution: The government and non-government organizations have the scope to make research in this field to measure, monitor, mitigate or control industrial river pollution in this locality.

- There is a very few research in this specific field in our country. Our neighboring country- India monitors water quality regularly throughout the year. Many of the industrialized countries of the world do so. As we have no intervention in this field, we have no database and we cannot take any remedial measures. The concerned authority has a huge scope in this field. For this purpose any organization that may be governmental, non governmental or autonomous organization can be engaged to do this. DoE, BCSIR or Atomic Energy Commission can monitor the water quality on a periodic basis. DoE, BCSIR or Atomic Energy Commission can provide technical assistance to the Town Planning Authorities of these districts if they feel interest to do such kind of research.

Conclusion

This has been relevant estimated the total pollution loads to water by all the industrial sectors of Bangladesh using the Industrial Pollution Protocol System (IPPS) method developed by the World Bank. In terms of pollution, the most polluting sector is the food industry, where the sugar mills and oil/fat factories cause most of the pollution. Pulp and paper industry is the worst water polluter. Metal industries (ferrous and nonferrous) rank first in terms of toxic metals emission. The largest amounts of toxic chemicals are released by the tanneries and leather industries (raw and processed). In terms of the total emission to air, water, and land, the top three most polluting industries are pulp and paper, food industry and tanneries/leather. These industries are large in size or are located in large clusters (tanneries), thus can be identified and managed as point sources of pollution. The other significant polluters include the metal and textile industries. These are dispersed all over the country and will be more difficult to manage from pollution control point of view.

Due to lack of resources, modern technology, and awareness, not much is being done to trap the harmful pollutants and reuse/recycle these chemicals. Recycling is practiced only when it is part of the production process, and not as a part of pollution mitigation activity. If strict environmental monitoring is enforced as per the Environmental Conservation Rules of 1997 and other relevant environmental laws, many of the industries of Bangladesh will be found in violation of the emission limits.

Industrial wastewater is notoriously known to contain strong color, a large amount of suspended solids, a highly fluctuating pH and a high temperature. Five samples from different places were tested to measure the water quality. The samples were analyzed for Color, Odor, pH, Temperatures, DO, BOD, EC, Turbidity, TDS and TSS. Physical parameters included temperature, electrical conductivity, pH, Total dissolved solids (TDS), total suspended solids and turbidity and chemical parameters such as dissolved oxygen (DO) and biological oxygen demand (BOD) was analyzed in the laboratory. Most of the parameters were highly intolerable in the study area. In this study, it is found that industries discharge large quantities of effluents at intolerable level that are composed of various pollutants. It is harmful for the aquatic lives that destroy the biodiversity. The effluent runs off to the river through the canal. This effluent damages each and every component of the stream. Moreover, WASA collects water from the point of the river that is highly polluted. After some purification process WASA supplies it to the locality but the water remains polluted with a large amount of dissolved solids, suspended solids, salts etc. The people that cause various health hazards are using this polluted water. Thus, it is the right time for the concerned authority to take necessary action to protect public health as well as the urban environment.

References

- Government of Bangladesh (GoB), 1995. Dhaka Metropolitan Development Plan (DMDP). Dhaka: Ministry of Planning.
- Government of Bangladesh (GoB), 2003. A Compilation of Environmental Laws of Bangladesh. Dhaka: Ministry of Forest and Environment.
- http://advisor.anamai.moph.gov.th/factsheet/index_en.htm, accessed on 20 April, 2010.
- Sayem, M. A. 2007. Characterization of Some Physicochemical Properties of the Industrial Effluents of Fatullah Industrial area, Narayanganj. BSc. report, Jahangirnagar University: Department of Environmental Science, Bangladesh.